Rice Briefs
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Managing rice with limited water

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This year is shaping up to be one of the driest on record for California and it is highly probable that agriculture water deliveries will be restricted. The question for rice growers is "what is the least amount of water I can grow rice with without hurting yields?"

The amount of water delivered to a rice field ranges from 4 to 7.7 acre feet (AF). Of this, evapotranspiration (ET, the amount of water that evaporates and transpires through the plant) is roughly 3 AF; percolation is less than 0.3 AF (due to heavy clay soils & impermeable hard pan); seepage ranges from 0 to 1 AF; and tail water drainage ranges from 1 to 4 AF. If there was no tail-water drainage, then rice could be grown using 4.3 AF of water. Growing rice with less water than that will depend on the percolation and seepage characteristics of the field, variety, time of planting, and end of season drain management. Below are a few strategies to reduce the impact of the drought and lessen water use in rice fields.

- If forced to fallow fields due to limited water availability, fallow fields with high percolation/seepage potential or high salinity (no-spill water management exacerbates salinity issues).
- Choose shorter duration varieties so that the time period the field has to be irrigated is shortened. Rice typically needs to be flooded from planting to reproductive stage 7 (R7, when one kernel on the main panicle is yellow; about 3 weeks after heading). On average CM-101, M-104 and S-102 require 100 days to reach R7; M-206 requires 104 days; M-202 and M-205 require 108-112 days; and M-401 requires 128 days. Shortening the period of irrigation can reduce ET by a couple of inches as well as reduce percolation and seepage losses. A couple of inches water saved per field when aggregated over the irrigation district is a substantial amount of water.
- Avoid early planting dates. Planting early increases water use as it increases the time to canopy closure and the period the crop needs to be irrigated until R7, thereby increasing the seasonal ET and percolation/seepage losses.
- Avoid draining after seeding (Leather's method). If stand establishment is an issue, seeding into very shallow water may improve establishment. Increase the field's water depth as seedlings establish and grow.
- When rice plants and weeds reach the appropriate stage for foliar herbicide applications (e.g. propanil), instead of lowering the water level by draining the field, plan ahead and let the water subside so that weed coverage is appropriate.
- At panicle initiation, adjust your water depth to a maximum of 6 inches. This depth is

enough to protect the developing panicles from cold temperature blanking.

- Before harvest, turn off the irrigation and allow the water to naturally subside rather than drain the field. Determining when the irrigation water can be turned off depends on how much water is in the field, climate, and soil properties (percolation and seepage). In fields with heavy clay soils, it is safe to not have standing water (soil still saturated) 24 days after 50% heading (when one-half of the panicles in a field have emerged) without risking yield loss and grain quality.
- UC research found no difference in water use between dry and wet seeded rice fields.

For more detail information on how to manage water this year, a video presentation by UC Cooperative Extension Rice Specialist Bruce Linquist is available on the UC Rice Blog (http://ucanr.edu/blogs/riceblog/index.cfm).

Flooding time and seedling pests

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Because of surface water allocation reductions this year, some growers may be relying more on ground water to flood and irrigate rice fields. Initial flooding time may be extended significantly when using ground water because of lower flow rates of pumps compared to surface water deliveries. When fields flood slowly, the potential risk of damage from rice seed midge, tadpole shrimp and seedling diseases may be greater.

Rice seed midge lay their eggs on the water surface. The longer a field is flooded before seeding, the more time midge adults have to lay eggs and larvae to develop. Then, after seeding, large populations of these larvae may feed on germinating seeds, killing them and reducing the stand.

Tadpole shrimp eggs are present in the soil and hatch one to three days after getting wet. This means that as the water moves through a field, eggs are hatching. Young tadpole shrimp are small and don't injure rice; they feed on organic matter and other small organisms. As they grow, their digging and feeding can uproot and injure developing rice seedlings. Longer flood times allow more time for tadpole shrimp growth so that they reach a size that may injure rice soon after seeding.

Similarly, fungi causing seed rot and seedling diseases survive in the soil and produce zoospores when the soil is flooded. Zoospores are attracted to cracks in the seed coat where the endosperm is exposed or to the germinating seedlings. Feeding by rice seed midge or tadpole shrimp may predispose seeds or seedlings to infection by these fungi.

If you are planning on using well water, pay extra attention to seedling pests. Insecticides can be used to manage tadpole shrimp, but because of the water shortage, draining to manage rice seed midge and seedling disease may not be feasible. To prevent seedling pest damage:

- Work and level fields to improve water flow across the field during the initial flooding.
- Seed promptly after flooding, and if necessary, seed basins in sequence as they fill with water.
- Use high quality seed, with 85% germination or more.

- In fields with a history of seedling pest problems, increase your seeding rate to compensate for stand losses.
- Plant when temperatures are adequate for rapid seedling growth.
- Scout your fields and make sure the stand is adequate (10 plants per square foot at a minimum). If the stand is severely reduced, promptly reseed.

Stay up-to-date with the UC Rice Blog

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As UC Cooperative Extension advisors, we strive to work on locally-relevant issues that are important to you. We strive to stay informed of the issues, learn solutions to problems, and then communicate those solutions so that we all can learn from them. One of the ways we communicate is through this newsletter; another way is by holding meetings. We will continue to use these methods to communicate with you, but we recognize that they have their limitations. For example, when we learn information that we want to communicate quickly, waiting until our next newsletter or meeting may mean that the information is no longer relevant. For this reason, many UCCE advisors and specialists are turning to blogs as a means of communicating timely information.

A blog, or web log, is a website where people post information in concise entries on a frequent basis. A blog also provides the opportunity for readers to provide comments in response to blog entries. There are currently over 100 blogs produced by members of UCCE. These blogs provide information on a range of topics related to our mission, including 4-H, food, landscaping, natural resources, and agriculture. Most blogs are written in English, but there are several written in Spanish. You can view the range of blogs at this website: http://ucanr.edu/blogs/blogcore/blogroll.cfm?sort=a

In terms of agriculture, there are blogs devoted to specific crops, like rice. On the UC Rice Blog, advisors and specialists highlight what they are currently seeing in the field and strategies for solving timely problems. They also announce upcoming meetings and new publications. For example, the most recent entry on the UC Rice Blog is a video presentation outlining strategies for managing rice systems with limited water.

Subscribing to a blog is an easy way to stay connected on the issues. To subscribe to the UC Rice blog, go to http://ucanr.edu/blogs/riceblog/index.cfm. From this homepage, find the subscribe box in the right, shaded column. Enter your email address, and click the envelope symbol. You will, then, be sent an email asking you to validate the subscription. Once you have clicked the validation link in that email, you're done! When a new post is made to UC Rice Blog, you will receive an email notification.

Again, we recognize that this may not be the preferred means of receiving information for some of you, but with the prevalence of smartphones, this is a great way to get information when you are on the go or in the field. Take a look, and let us know what you think.

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